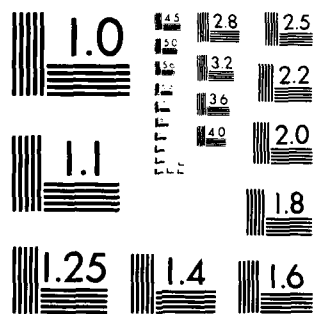


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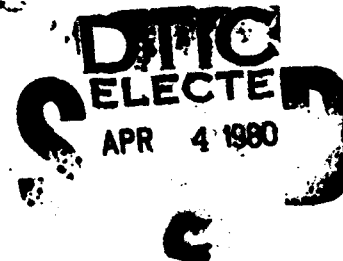
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A REVIEW OF THE  
AIRPORT DEVELOPMENT AID PROGRAM (ADAP)  
AND ASSESSMENT OF FUTURE PROGRAM NEEDS



JANUARY 1980

## DEPARTMENT OF TRANSPORTATION FEDERAL AVIATION ADMINISTRATION

OFFICE OF AVIATION SYSTEM PLANS  
OFFICE OF AIRPORT PLANNING AND PROGRAMMING  
WASHINGTON, D.C. 20591

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16. Abstract This report was prepared by the Federal Aviation Administration (FAA) to assess the accomplishments of the Airport Development Aid Program (ADAP) authorized by the Airport and Airway Development Act of 1970. It was undertaken at this time as part of the process of developing a legislative proposal for Federal aid to airports after 1980. The report examines the \$3.9 billion of Federal, State, and local expenditures that were made during fiscal years 1971 through 1978 and identifies areas where changes might be made to achieve a more effective Federal aid program for airports in the future. The report also provides a brief outline of accomplishments under the Planning Grant Program (PGP).			
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## EXECUTIVE SUMMARY

This report was prepared by the Federal Aviation Administration (FAA) to assess the accomplishments of the Airport Development Aid Program (ADAP) authorized by the Airport and Airway Development Act of 1970. It was undertaken at this time as part of the process of developing a legislative proposal for Federal aid to airports after 1980. The report examines the \$3.9 billion of Federal, State, and local expenditures that were made during fiscal years 1971 through 1978 and identifies areas where changes might be made to achieve a more effective Federal aid program for airports in the future. The report also provides a brief outline of accomplishments under the Planning Grant Program (PGP).

Of the \$3.9 billion of development accomplished during the first 8 years under the ADAP, \$2.7 billion were Federal funds drawn from the Airport and Airway Trust Fund and \$1.2 billion were State and local funds. Approximately half of this was used to increase the safety of the airport system by rehabilitating worn-out facilities, as well as bringing airports up to FAA design standards, and providing special safety related facilities such as fire and rescue equipment, security fencing, and runway surface friction treatments. The other half was spent to increase the capacity of the airport system by upgrading airports to serve larger aircraft, increasing their capacity to reduce delays, and building new airports.

The greatest share of the development took place at airports served by certificated air carriers. \$1.3 billion, or 34%, went to air carrier airports in the 24 major metropolitan areas, known as large hubs, that generate two-thirds of the Nation's airline passengers. About half of this \$1.3 billion was directed at delay reduction. The effect is obvious; annual passenger enplanements have increased by over one hundred million since the late 1960's, but delays are much less severe than they were then. This is particularly true at airports where parallel runways were constructed, such as Atlanta, Philadelphia, Honolulu, and Denver. Other major expenditures at large hub airports included reconstruction of aging facilities and bringing airfields up to modern design standards.

\$2.0 billion was spent to develop 458 medium, small, and non-hub air carrier airports. The emphasis was on rehabilitating aging facilities, bringing airfields up to modern design standards, and extending runways and strengthening pavement to accommodate commercial jet aircraft as they were introduced into local service.



\$61 million was spent at 85 commuter service airports, of which 60% went to reconstruct aging facilities and to bring airfields up to modern design standards. The remainder went to acquire safety related equipment, accommodate larger aircraft, and increase capacity.

\$148 million was spent to develop 105 reliever airports. These are the very active general aviation airports in metropolitan areas that serve light aircraft that might otherwise be forced to use primary air carrier airports. Most of this money was used to bring existing airports up to modern design standards, increase their capacity, and rehabilitate aging facilities. Despite the urgent need to expand the reliever airport system, only 17% of the expenditures went to build new airports or to acquire important privately owned relievers.

\$368 million was spent to develop 910 general aviation airports, including almost 100 new airports in communities with significant aeronautical potential but without an adequate airport. \$134 million was spent to bring existing airports up to current design standards and \$105 million to expand airports to serve more and larger aircraft.

To determine whether changes are needed in the allocation of Federal aid to airports, the spending patterns established in the 1970's were compared to the development needs that are forecast for the period from FY 1981 through 1985. It was found that, unless allocation procedures are revised, commuter, reliever, and general aviation airports might be seriously underfunded. A streamlined allocation system with fewer individual funding categories would facilitate the application of funds to the highest priority projects in the future.

Comparing past spending patterns to future needs also reveals that, during the 1980's, there will probably be less need to spend for reconstruction of aging facilities. Emphasis will probably shift to projects which increase system capacity.

## CHAPTER I

### INTRODUCTION

#### Airport and Airway Development Act of 1970

In May 1970, Public Law 91-258, a two-title law authorizing key Federal aviation programs and user taxation was enacted. Title I was the Airport and Airway Development Act, and Title II, the Airport and Airway Revenue Act. The 1970 Act authorized \$280 million annually in airport related grants through 1975, or nearly four times the highest amount (\$75 million) authorized annually under the previous Federal Airport Act. The rationale behind the 1970 law was the establishment of a user charge/trust fund approach to airport and airway development funding. Title II established user taxes on commercial passenger fares, and air freight way bills, noncommercial aviation gasoline and jet fuel, and aircraft tires and tubes, with the revenue going into a new Airport and Airway Trust Fund. The proceeds of the Trust Fund would be used to finance programs and activities authorized by Title I, the airport and airway development portion of the law. The 1970 Act also required the formulation of a National Airport System Plan (NASP) and provided broad guidance on what airports were to be included in the plan.

Two grant-in-aid programs were authorized by the 1970 legislation. These were the Planning Grant Program (PGP) and the Airport Development Aid Program (ADAP). The grant programs were to fund matching assistance programs in which the Federal Government paid a predetermined share of approved airport planning and development project costs, and the airport owners at the various State and local levels, who were eligible to participate in the program, paid the rest. To be eligible to receive grants, an airport must be of sufficient importance to be included in the NASP.

The 1970 Act provided that the funding authority of the grant-in-aid programs would expire on June 30, 1975, at the end of the Act's first five years of operation. The object was to determine after several years experience what, if any, changes needed to be made before further funds were authorized for the Act's remaining five years.

#### Amendments to the 1970 Act

The Act has been amended three times. It was amended in 1971 (P.L. 92-174) to incorporate provisions involving the use, preservation, and priority for expenditure of funds from the Trust Fund. The Airport Development Acceleration Act of 1973 (P.L. 93-44) made further amendments to the 1970 Act, increasing annual authorizations for fiscal years 1974 and 1975 and increasing the Federal contribution for grants for most airports. Most recently, the Airport and Airway Development Act Amendments of 1976 (P.L. 94-353, enacted July 12, 1976) made several changes to the Act, affecting, among other things, project eligibility, increased overall funding levels, distribution of funds, the project approval process, the percentage of the Federal contribution for most projects, extension of the planning grant program, and revision of the National Airport System Plan.

The purpose of the PGP and ADAP is to bring about the establishment of a nationwide system of public airports adequate to meet the present and future needs of civil aeronautics. With the conclusion of fiscal year 1978, both programs completed 8 years of operation, with 2 years remaining under existing legislation. Historically, Federal investments in the national system of airports have been described mainly in terms of numbers of projects, numbers of new runways constructed, numbers of new airports established, and other such physical measurements. This method of accounting, however, does not provide a means of assessing how Federal airport assistance funds have been allocated in support of the FAA's policy and planning objectives related to civil airports.

#### Principal Operating Characteristics of the Planning Grant Program

The Airport and Airway Development Act of 1970, as amended (Section 13), authorizes the FAA (through delegation from the Secretary of Transportation) to make grants to planning and public agencies for preparation of airport system and master plans. The program is designed to promote the effective location and development of publicly owned airports.

System plans are developed by state or areawide planning agencies to formulate air transportation policy, determine airport facility requirements needed to meet forecast demands, and to establish the framework for detailed airport master planning. Airport master plans, which are developed by the airport operator, focus on the nature and extent of development required to meet the future aeronautical demand at a particular facility.

From the inception of this program in FY 1971 through FY 1978, 1,629 planning grants have been issued totaling \$71.8 million. Of these, 1,472 were for master planning (\$55.0 million) and the remaining 157 were for system planning projects (\$16.8 million). Included in the latter were the initiation of state system plans for 43 states, the Commonwealth of Puerto Rico, and the Trust Territory of the Pacific Islands.

When the program first began, the Federal Government provided up to two-thirds of the cost of planning grant projects. However, the enactment of the Airport and Airway Development Act Amendments of 1976 increased the Federal share of planning projects. The Federal Government now provides 75 percent of the cost of airport system plans. The Federal participation rate in the cost of airport master plans during Fiscal Years 1976-78 was set at 90 percent for general aviation airports and varied from 75 to 90 percent for air carrier airports, depending upon the number of passengers enplaned; the 90% Federal share dropped to 80% in FY79 and FY80. The participation rate in master plans may be higher in public land states.

Emphasis in airport planning and development is placed upon maintaining the viability of our existing airports to accommodate the projected increase in aviation demand. A critical issue affecting the viability of the existing system is the annoyance caused by noise from aircraft taking off and landing at these facilities. The airport owner is primarily responsible for the effect of aircraft noise on the community, and for developing action plans to reduce the impact of the noise. To assist airport owners in carrying out this responsibility, the DOT and FAA have

jointly established a pilot program to encourage the development of airport noise control and land-use compatability (ANCLUC) plans as part of PGP-funded master plans. The pilot program provides for up to 25 ANCLUC plans for each of the years 1977 and 1978.

Another noteworthy accomplishment of the PGP is the issuance of funds for continuous airport system planning. The objective of continuous planning is to insure that existing system plans remain responsive to the air transportation needs of an area. To accomplish this objective, grants are given to the responsible planning agencies for continuous monitoring of aviation activity and necessary updating of the appropriate sections of the system plans. This is an efficient way to keep system plans current and can effectively strengthen the aviation expertise of state and metropolitan area planning organizations. A system plan that is not maintained through continuous planning usually has a five-year life. At that time, it is necessary to issue a grant to completely update the initial system plan.

#### Principal Operating Characteristics of the Airport Development Aid Program (ADAP)

Section 14 of the Airport and Airway Development Act of 1970, as amended, authorizes the Secretary of Transportation to make airport development grants in order to bring about, in conformity with the National Airport System Plan (NASP), the establishment of a nationwide system of public airports adequate to meet the present and future needs of civil aeronautics. The Airport and Airway Development Act Amendments of 1976 (P.L. 94-353), enacted on July 12, 1976, contain additional funding and add several new eligible items of development.

The 1976 amendment raised the annual program level from \$310 million, established in 1973, to a range of \$500 million to \$610 million over the five-year period through fiscal year 1980. This provides \$435 to \$525 million annually for airports serving all segments of aviation, including a category of air carrier airports identified as commuter service airports. It further provides \$65 million to \$85 million annually for general aviation airports, including airports that relieve congestion at high density locations. It also revised the percentage of Federal participation in eligible airport development upward from previous levels of 50 to 75 percent. ADAP participation at all except the busiest airports was increased to 90 percent until September 30, 1978, and then dropped to 80 percent for FY 1979 and 1980. Air carrier airports, other than commuter service airports, whose total annual passenger enplanements are 0.25 percent or more of the total annual passenger enplanements of all such airports received Federal participation of 75 percent. There are slight upward adjustments in a few states containing a high percentage of public land that results in Federal participation up to 93.75 percent of project costs.

In the case of airport development projects involving safety and/or security equipment, the 1976 amendment provides for the same rate of Federal participation as for other items of development. This revises a 1973 amendment that allowed 82 percent funding for these purposes.

The following items were made eligible under the 1976 Amendments: (1) snow removal equipment; (2) noise suppressing equipment; (3) physical barriers and landscaping to diminish the effect of aircraft noise; (4) acquisition of land for noise compatibility purposes and, (5) terminal development (including multi-modal terminal development) limited to nonrevenue producing public use areas directly related to passenger movement at airports serving air carriers certificated by the CAB. A maximum of 50 percent Federal share is allowed for terminal development with no more than 60 percent of a sponsor's enplanement funds for any fiscal year to be obligated for this purpose.

The amendments permit certifications to be accepted from sponsors indicating that they will comply with all program statutory and administrative requirements. Other significant provisions of the amendments are: allowance for multi-year grants at air carrier airports for projects extending over several years and funding for grants to states to assist them in developing their own general aviation airport development standards, other than standards for safety of approaches. A maximum of \$25,000 may be granted to a single state for development of standards.

#### Program Criteria for ADAP

To meet the intent of the legislation, criteria have been developed to accommodate the goals set forth in the Act. Recognition is given to the needs of all segments of aviation and to the prime goals of improving safety and increasing capacity.

Priorities are determined from a numerical rating table through which various factors are weighed, such as National Airport System Plan role, work essentiality, and timing of need. This process is not purely a mathematical computation, but rather the exercise of judgmental discretion in the application of these guidelines.

Programs of approved projects are developed on a continuing basis and allocations announced periodically. All requests within a given state, when projects meet basic eligibility requirements, are assigned a priority rating and programmed to the extent of available funds. Programs are monitored on a national basis to assure that the priority level of projects is uniformly applied throughout the Nation.

#### Implementation

Policy and procedures for administering the ADAP are developed and published in Part 152, Federal Aviation Regulations, including guidance on: (1) procedures for submission of requests for aid; (2) consideration of environmental effects; (3) eligibility of navigation aids; (4) landing aid requirements; (5) requirements for public hearings to consider the social, economic and environmental aspects of proposed airport development; (6) applicability and effect of the Uniform Relocation and Real Property Acquisition Policies Act; and (7) project approval.

## CHAPTER II

### ALLOCATION OF ADAP EXPENDITURES

#### ADAP Study

The purpose of the PGP and ADAP is to bring about the establishment of a nationwide system of public airports adequate to meet the present and future needs of civil aeronautics. With the conclusion of fiscal year 1978, both programs completed 8 years of operation, with 2 years remaining under existing legislation. Historically, Federal investments in the national system of airports have been described mainly in terms of numbers of projects, numbers of new runways constructed, numbers of new airports established, and other such physical measurements. This method of accounting, however, does not provide a means of assessing how Federal airport assistance funds have been allocated in support of the FAA's policy and planning objectives related to civil airports.

A study\* was recently undertaken to compile an accurate record of how ADAP funds were distributed by type of airport and by goals, or objectives, of the expenditures, such as increasing airport system safety and security, reliability and accessibility, and capacity. These data, when compared to the airport development needs shown in the NASP, will indicate how well the ADAP has responded to the Nation's airport development needs as depicted in the NASP. They will also highlight areas where changes, such as increased funding or revised priorities, may be in order.

#### FAA Goals/Objectives

A list of specific goals and objectives which relate to the planning and development of the national airport system was compiled by the ADAP Study Advisory Committee.\*\* This list, which is presented in Table 2.1, is divided into five major categories:

- A. Planning
- B. Safety and Security
- C. Capacity
- D. Service Reliability/Accessibility
- E. Environment

\*Distribution of Federal Aid to Airports, 1971-78, Battelle Columbus Laboratories/Unified Industries, June 1979.

\*\*A committee formed at the inception of the study to monitor the contract effort; representatives from DOT/Office of Programs and Evaluation (B-10), FAA/Office of Airport Planning and Programming (APP), and FAA/Office of Aviation System Plans (ASP).

TABLE 2.1    ADAP Study Advisory Committee  
List of Goals/Objectives

---

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A. Planning

- 1 - Provide continuous, comprehensive, and coordinated airport planning guidance for allocating Federal and associated non-Federal resources in United States civil airport development.

B. Safety and Security

- 2 - Increase safety of aircraft operations by bringing airports up to design standards or replacing existing substandard airports or airport facilities.
- 3 - Increase safety of aircraft operations by increasing safety margins.
- 4 - Increase safety of aircraft operations by insuring rapid response by adequate airport crash/fire/rescue facilities to minimize loss of life, injury and property damage in the event of aircraft accidents.
- 5 - Increase security of aircraft operations by preventing unauthorized or hazardous access to aircraft operating areas.

C. Capacity

- 6 - Provide adequate community or metropolitan area airport system airside capacity to minimize congestion and delay of current and forecast aircraft operations (i.e., increase normal, peak hour airport or airport system airside capacity); includes expanded aircraft parking facilities.
- 7 - Provide adequate community or metropolitan area airport system ground access and passenger terminal building capacity to minimize passenger landside access time, congestion and delay.
- 8 - Upgrade existing airports to serve larger and more demanding aircraft.

D. Air Transportation Reliability/Accessibility

- 9 - Preserve or improve the usefulness and maintainability of existing airport airside facilities through repair or reconstruction.
- 10 - Increase airport usability by aircraft under varying conditions of weather and darkness.
- 11 - Provide air access or improve air access reliability to communities or remote areas of national interest through establishment of additional or replacement airports where justified.

E. Environment

- 12 - In carrying out necessary airport development, restore or enhance environmental quality to the fullest extent practicable. Make a special effort to preserve the natural beauty of the countryside, public parks, and recreation lands, wildlife and waterfowl refuges, historic sites, and the Nation's coastal zone.
  - 13 - Reduce to a minimum the adverse impact of noise generated by aircraft operations at airports.
  - 14 - Reduce energy requirements of airport operations by increasing operating efficiency where cost beneficial.
- 
-

### Planning

The FAA's objective in airport planning is to promote the development of a safe and efficient national system of airports that is adequate to meet current and future demand. Toward this end, the FAA develops the National Airport System Plan (NASP) and provides financial aid and guidance for locally prepared master and system plans, incorporating the results that are consistent with National objectives in the NASP.

### Safety and Security

Provision of a safe and secure air transportation system is the FAA's primary objective. Within the scope of ADAP objectives, the FAA provides for adequate safety margins to insure that no aircraft accidents are caused by airport design deficiencies. They encourage the implementation of new equipment that can provide increased safety margins. Furthermore, the FAA requires that adequate emergency equipment be available at air carrier airports, should the need arise.

### Capacity

The FAA is extremely interested in minimizing aircraft congestion and delays. Reduced congestion and delays result in increased levels of safety, energy savings, and time savings for passengers. In order to meet these objectives, the FAA encourages the construction and improvement of those airport components which are required to provide adequate airside and landside capacity.

### Service Reliability/Accessibility

ADAP funds are provided for major rehabilitation of airport facilities. The FAA also provides assistance for installing various devices which will improve airport accessibility under varying weather conditions. Any improvement which preserves or extends the airport's usability or provides more people easier access to the air transportation system is included in this objective.

### Environment

Although the FAA is responsible for development of the airport system, the agency is also committed to restoring and/or enhancing the level of environmental quality to the fullest extent practicable. Every effort is made to preserve the natural beauty of the surrounding areas by minimizing noise exposures and energy requirements of both airside and landside airport operations. Energy savings are side effects of many types of airport improvements, particularly those that reduce delays or promote more efficient use of air transportation. Projects are not usually initiated for the primary purpose of saving energy, but this is a residual effect of most capacity and reliability projects.



### Inventory of Airport Improvements

A list of various improvement items obtained under the ADAP and PGP was compiled for each objective. This list, which is not necessarily all inclusive, is contained in Table 2.2. It is apparent that many improvement items could reasonably fit into more than one goal category. An effort was made to allocate ADAP project costs to the most reasonable or appropriate objective, but it is important that the results be interpreted with some amount of judgment and recognition that many items could have been placed, almost as appropriately, in different categories.

### Allocation by Objectives

Since the allocation procedure required a detailed examination of ADAP project files, a sample of the entire ADAP project universe was used. In the sampling process, 502 airports were selected for detailed analysis. The airport sample was not randomly distributed across the entire population, nor was the selection of airports within a given airport type classification randomly distributed. In order to sample a greater proportion of ADAP expenditures, (1) a greater proportion of the larger airports, which had received the most Federal aid, were selected, and (2) within each airport classification, the airports were selected sequentially according to total ADAP expenditures. Also, only projects that had been physically completed were sampled (so that correct total project costs would be captured). Because the selected airports do not represent a stratified random sample, but rather a stratified "judgment" sample, inferences made about the entire population must be carefully interpreted. Specifically, larger airports and projects are over-represented while smaller airports and projects are under-represented. Some of this tendency was offset by including in the sample a supplemental selection of general aviation airports. The sample representation of the universe is summarized in Table 2.3.

Table 2.4 shows total ADAP commitments for projects initiated prior to July 1978, whether the projects was completed or still under construction. These values were taken from the ADAP Master file at the FAA. Table 2.5 presents this data together with numbers of projects in a different format, revealing some dimensions of the ADAP. The sample distribution of ADAP expenditures among objectives was applied to these total ADAP expenditures to arrive at an estimate of the universe distribution among objectives. The resulting estimated distribution of ADAP expenditures is shown in Tables 2.6 and 2.7 and graphically depicted in Figures 2.1 through 2.4.

Recalling that the sample was selected sequentially, according to total ADAP expenditures, from each airport type, these estimates are subject to the assumption that the distribution of ADAP expenditures across airports with smaller expenditures was the same as the distribution across airports with larger expenditures, within each airport category.

**TABLE 2.2 TYPES OF ADAP/PGP IMPROVEMENTS  
ASSOCIATED WITH EACH OBJECTIVE\***

Objective	Sub	ADAP/PGP Item
Planning	1	<ul style="list-style-type: none"> <li>-Airport Master Plan</li> <li>-State System Plan</li> <li>-Regional System Plan</li> <li>-Metropolitan System Plan</li> </ul>
Safety & Security	2	<ul style="list-style-type: none"> <li>-Airport Development Land</li> <li>-Clear Zone</li> <li>-Land for Approach and Transition</li> <li>-Runway Safety Area</li> <li>-Obstruction Removal</li> <li>-Other Design Standard Requirements</li> </ul>
	3	<ul style="list-style-type: none"> <li>-Runway Grooving</li> <li>-Runway End Identifier Lights (REIL)</li> <li>-Visual Approach Slope Indicator (VASI)</li> <li>-Wind Indicator</li> <li>-Segmented Circle Marker</li> <li>-Pavement Marking of New Surfaces</li> <li>-Crosswind Runways</li> <li>-Snow Removal Equipment and Buildings</li> </ul>
	4	<ul style="list-style-type: none"> <li>-Fire and Rescue Equipment Building</li> <li>-Fire Fighting Equipment</li> <li>-Proximity Suits</li> </ul>
	5	<ul style="list-style-type: none"> <li>-Housing for Facilities and Activities for Safety of Persons</li> <li>-Security Fencing</li> </ul>
Capacity	6	<ul style="list-style-type: none"> <li>-Airport Development Land</li> <li>-New Runways, Taxiways, Aprons</li> <li>-Apron Extensions and/or Widening</li> <li>-Runway, Taxiway, Apron Site Preparation</li> </ul>
	7	<ul style="list-style-type: none"> <li>-Airport Development Land</li> <li>-Airport Access Road</li> <li>-Terminal Development</li> </ul>

\*See Table 2.1 for definition of objectives

TABLE 2.2 (Concluded)

Reliability/ Accessibility	8	-Airport Development Land -Runway, Taxiway and Apron Site Preparation -Runway, Taxiway, and Apron Extensions, Widening, Strengthening
	9	-Maintenance Building -Runway, Taxiway, and Apron, Reconstruction/Overlay, Shoulder Stabilization, and Associated Site Preparation -Rehabilitation and/or Modification of Existing Runway Light System -Service Road -Pavement Marking After Overlay
	10	-Approach Light System (ALS) and Land for Navigation Aid Components -Electrical Vaults -Runway Lighting -Standby Power Equipment -Taxiway, Apron, and Low Intensity Lighting -Site Preparation and Installation of ALS, Instrument Landing System (ILS), and Terminal Aid Facilities -Initial IFR Runway Markings
Environment	11	-Eligible Facilities for New Airports
	12	-No Specific Items
	13	-Land for Compatible Noise Levels -Construct Noise Barriers -Landscaping to Diminish Noise
	14	-No Specific Items

Table 2.3

ADAP Sample Representation of Universe

	<u>Universe</u>	<u>Sample</u>	
		<u>Number</u>	<u>%</u>
Airports that Received ADAP Funds	1595	502	31
ADAP Projects Initiated:			
Number	5307	1364	26
Federal Funds (\$ million)	2683	856	32
Local Funds (\$ million)	1234	576	47
Total Funds (\$ million)	3917	1432	37
Average Federal Share (%)	68	58	--
ADAP Projects Completed:			
Number	2584	1364	53
Federal Funds (\$ million)	1143	856	75
Local Funds (\$ million)	724	576	80
Total Funds (\$ million)	1867	1432	77
Average Federal Share (%)	61	58	--

Table 2.4

**Total of ADAP Commitments for Projects Initiated  
Prior to July 1978 (Completed or Not)**

<u>Airport Type</u>	<u>Federal Commitments (\$ Thousands)</u>	<u>% of Total</u>	<u>Federal Plus Local Commitments (\$ Thousands)</u>	<u>Average % Federal Share</u>
A/C large hub	773,901	29	1,347,856	57
med hub	464,773	17	698,357	67
small hub	441,876	16	577,564	77
non-hub	558,812	21	715,747	78
A/C Total	2,239,362	83	3,339,524	67
Commuter - BU*	3,634	—	4,087	89
" - BT	21,689	1	24,239	89
" - GU	13,058	—	14,605	89
" - GT	16,682	1	18,537	90
Commuter Total	55,063	2	61,468	90
Reliever - BU*	7,075	—	9,026	78
" - BT	65,453	2	89,365	73
" - GU	17,790	1	24,144	74
" - GT	18,794	1	25,198	75
Reliever Total	109,112	4	147,733	74
General Aviation - BU*	86,976	3	114,637	76
" - BT	84,553	3	115,635	73
" - GU	100,541	4	127,268	79
" - GT	7,303	—	10,397	70
GA Total	279,373	10	367,937	76
TOTAL	2,682,910	100	3,916,662	68
COMPLETED PROJECTS	1,143,109	43	1,867,115	61
PROJECTS IN PROCESS	1,539,801	57	2,049,547	75

**\* Airport Design Categories:**

Basic Utility (BU)..... accommodates most single-engine and many of the smaller twin-engine aircraft.

General Utility (GU).... accommodates virtually all general aviation aircraft under 12,500 pounds gross takeoff weight.

Basic Transport (BT).... accommodates business jets under 60,000 pounds.

General Transport (GT).. accommodates transport-type aircraft under 175,000 pounds (similar to air carrier aircraft).

TABLE 2.5 DISTRIBUTION OF THE ADAP PROJECTS  
BY AIRPORT CLASSES (FY 71-JULY 1978)

	Large/Med. Hub	Small/Nonhub	Commuter	Reliever	General Aviation
Number of NASP Airports	75	545	133	147	2,237
Number Receiving ADAP Funds	75	420	85	105	910
Number of ADAP Projects	874	2,176	143	333	1,781
Average Number of Projects per Airport Receiving ADAP Funds	12	5	2	3	2
Total Federal Plus Local Funds (\$1000)	2,046,213	1,293,311	61,468	147,733	367,937
Federal Plus Local Funds per Airport Receiving ADAP Funds (\$1000)	27,283	3,079	723	1,407	404
Federal Plus Local Funds per Project (\$1000)	2,341	594	430	444	207

**TABLE 2.6**  
**ESTIMATED DISTRIBUTION**  
**FEDERAL ADAP EXPENDITURES (THOUSANDS OF DOLLARS)**

TABLE 2.7

## ESTIMATED DISTRIBUTION

## FEDERAL &amp; LOCAL ADAP EXPENDITURES (THOUSANDS OF DOLLARS)

Objectives*	SAFETY/SECURITY				CAPACITY				ACCESSIBILITY/RELIABILITY				ENVIRONMENT**				AIRPORT
	2	3	4	5	6	7	8	9	10	11	12	13	14	TYPE SUM			
A/C LRG HUB	125610	40141	37675	25977	356166	234855	91906	193402	61233	173001	6059	63	0	134705			
A/C MED HUB	108512	14174	19795	8855	140695	44912	52900	189465	47049	0	0	0	0	69035			
A/C SML HUB	53302	20619	20979	12406	136319	15311	133545	140267	27900	740	0	0	0	57756			
A/C NON HUB	88120	53575	50573	14254	105459	2054	165098	160400	54671	11047	0	0	0	71574			
AP GRP SUM	439640	120509	145022	61492	730639	297932	444249	699702	190941	186476	6059	63	0	333952			
		774003 (23.2%)				1400820 (44.3%)			1077119 (32.3%)			6922 (0.2%)					
COMPUTER-BU	622	236	0	49	0	0	0	2745	305	0	0	0	0	400			
COMPUTER-BT	2295	1061	4241	570	2064	2120	3360	6154	1574	0	0	0	0	2423			
COMPUTER-GU	3655	617	151	341	2114	218	2272	3496	1661	80	0	0	0	1460			
COMPUTER-GT	2989	1365	664	83	1909	560	2459	4666	3442	0	0	0	0	1053			
AP GRP SUM	9561	4129	5956	1043	6007	3290	8091	17061	7062	80	0	0	0	6146			
		19700 (32.2%)				17476 (26.4%)			24203 (39.4%)			0					
RELIEVER-BU	0	166	0	251	4934	0	0	323	195	3257	0	0	0	902			
RELIEVER-BT	29641	1237	991	2445	17210	0	11231	6552	4540	15910	0	0	0	8930			
RELIEVER-GU	3002	606	100	297	7600	210	2542	2420	1736	5535	0	0	0	2414			
RELIEVER-GT	4700	711	762	919	4574	2120	0	9786	1530	0	0	0	0	2519			
AP GRP SUM	37423	2720	1541	3912	34218	2330	13773	19089	8009	24710	0	0	0	14773			
		46500 (30.9%)				50320 (34.1%)			51800 (35.1%)			0					
GEN AVIA-BU	24506	2997	17	1454	12036	540	4991	11316	11536	45244	0	0	0	11463			
GEN AVIA-BT	32041	6112	0	827	14013	713	11263	25450	12290	12910	0	0	0	11563			
GEN AVIA-GU	23332	7572	1446	1757	17307	872	41320	17171	11219	5167	0	105	0	12720			
GEN AVIA-GT	0	799	0	0	0	0	2794	4705	2099	0	0	0	0	1039			
AP GRP SUM	79879	17480	1463	4030	43356	2125	60368	58650	37152	63321	0	105	0	36793			
		102860 (28.0%)				105940 (28.8)			159123 (43.2%)			105 (0.0%)					
GOAL TOTALS	566503	152030	153002	70405	822300	305693	526401	794502	243164	274507	6059	168	0				
%	14.5	3.9	3.9	1.8	21.0	7.8	13.4	20.3	6.2	7.0	0.2	0.0	0.0				
GOAL GRPUP TOTALS			942900			1654474			1312253			7027		3916662			
			24.1%			42.2%			33.5%			0.2%					

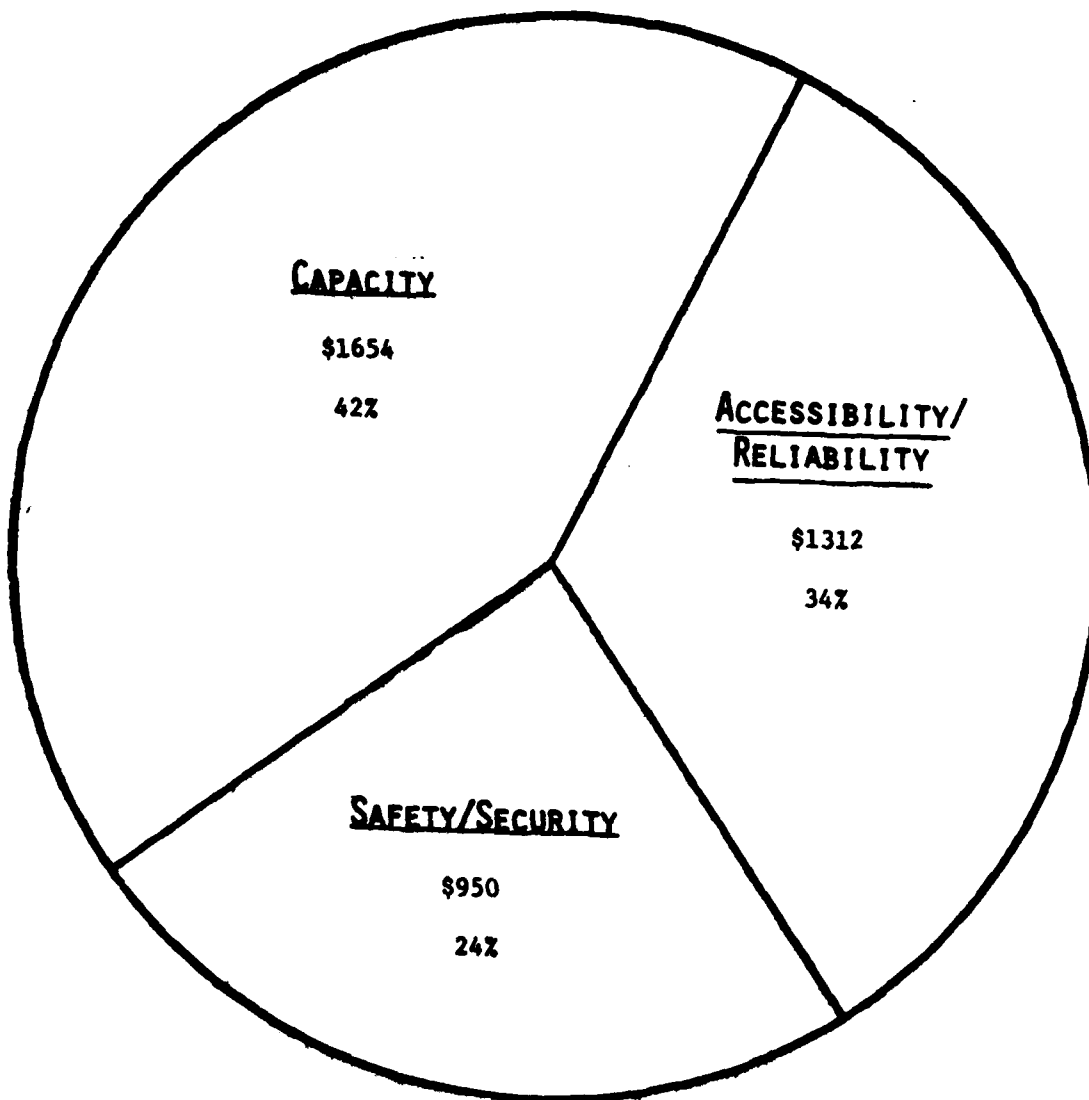
\*See Table 2.1 for definition of objectives.

\*\*See section on environmental projects on page 23.



FIGURE 2.1

DISTRIBUTION OF ADAP EXPENDITURES AMONG FAA  
OBJECTIVES, FY 1971-1978 (FEDERAL AND LOCAL  
FUNDS, \$MILLIONS)



TOTAL = \$3917

Figure 2.2

Distribution of ADAP Expenditures Among  
FAA Objectives

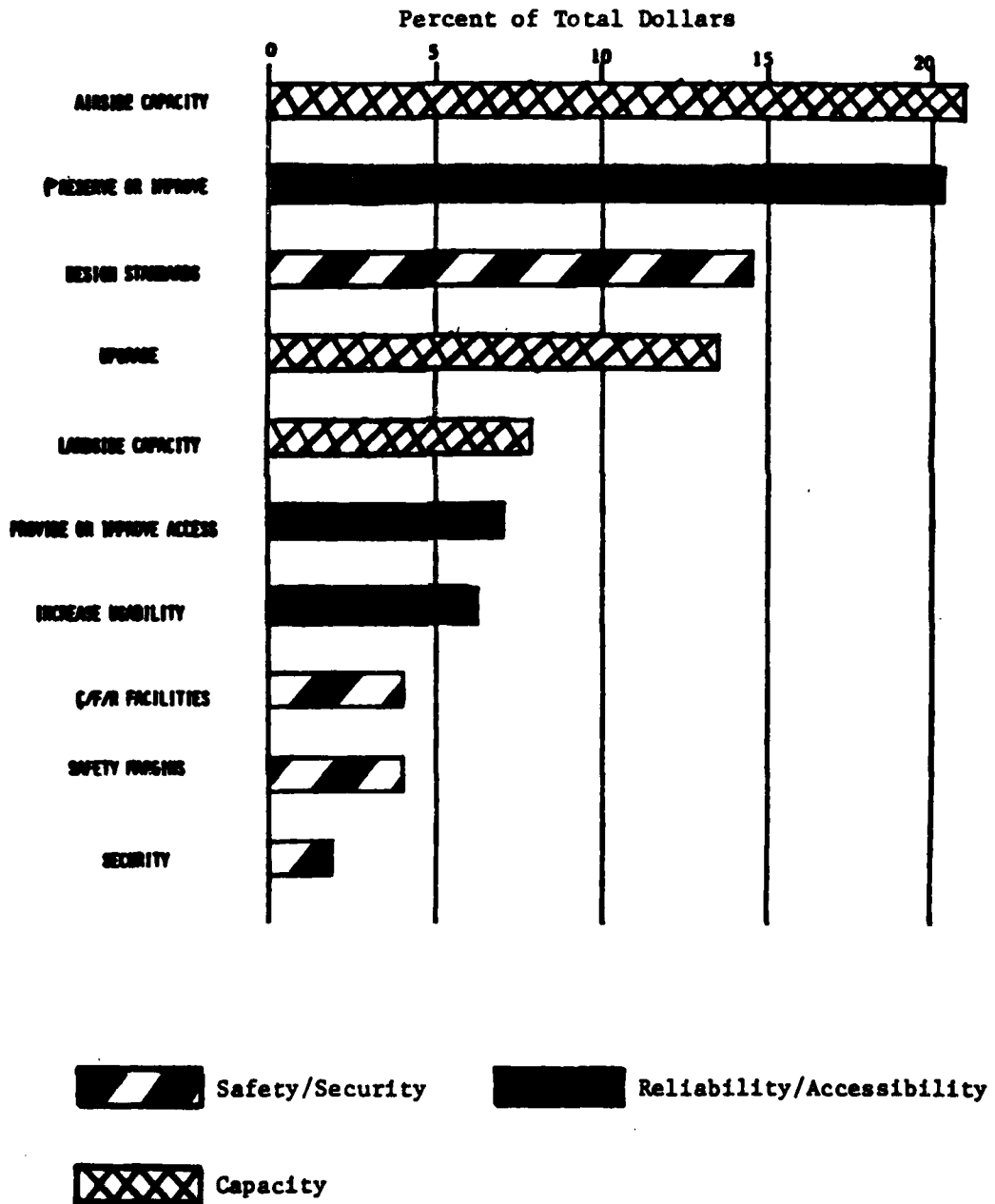
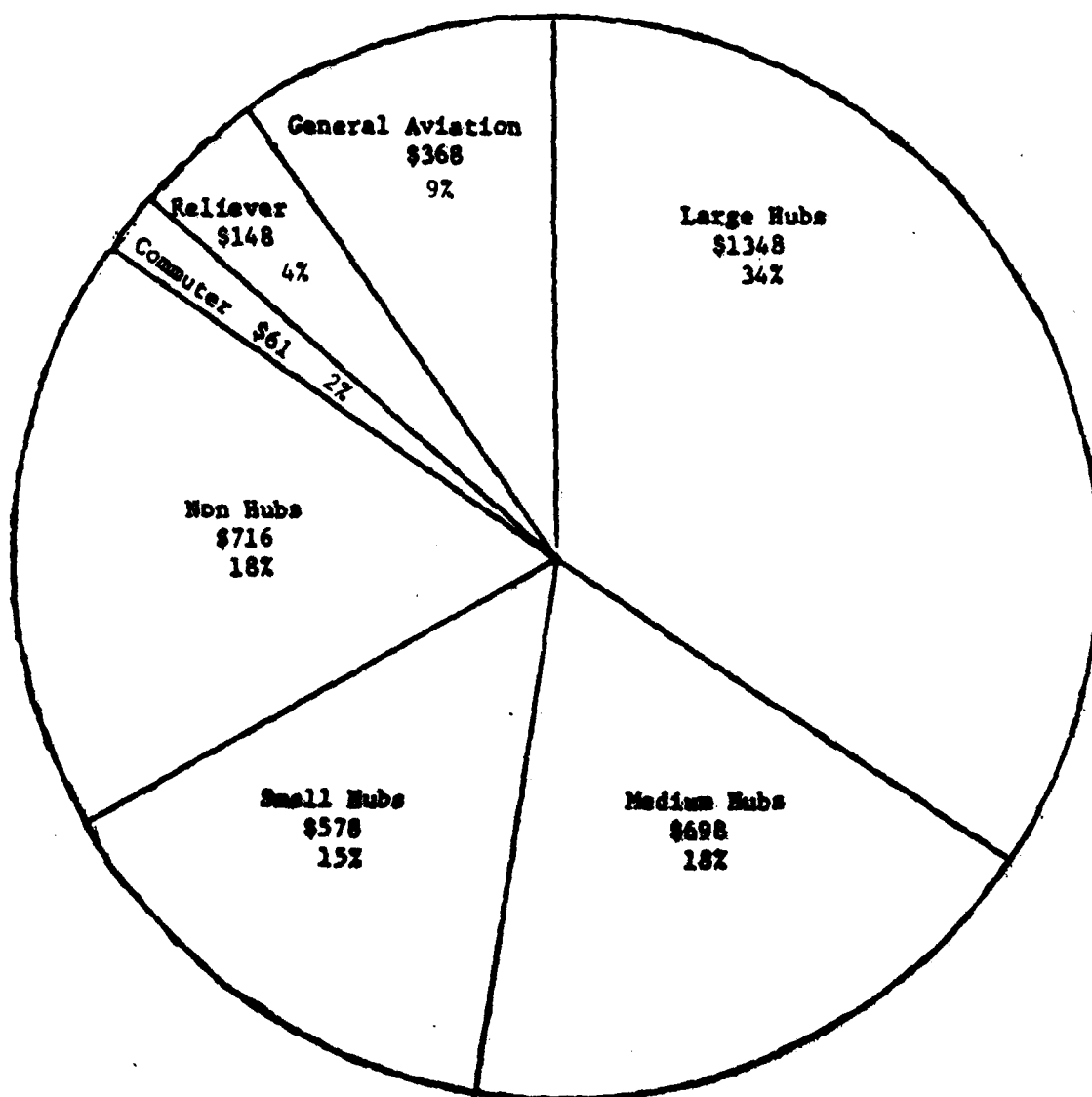


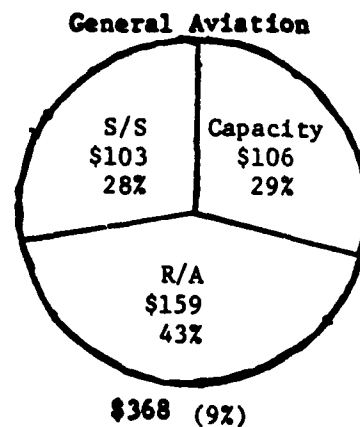
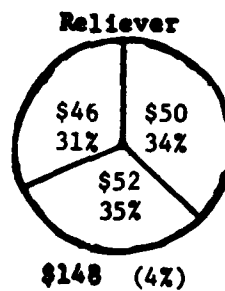
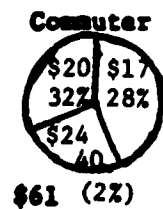
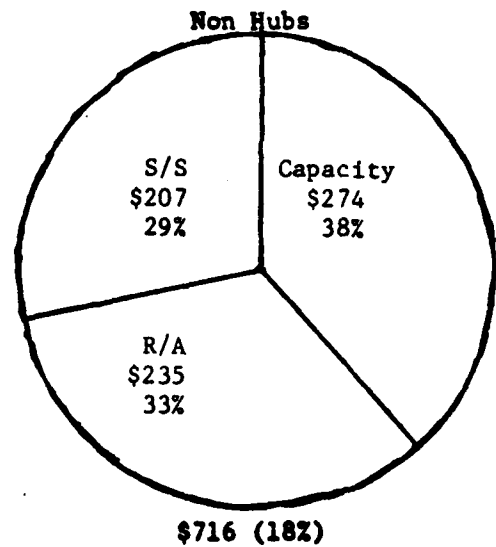
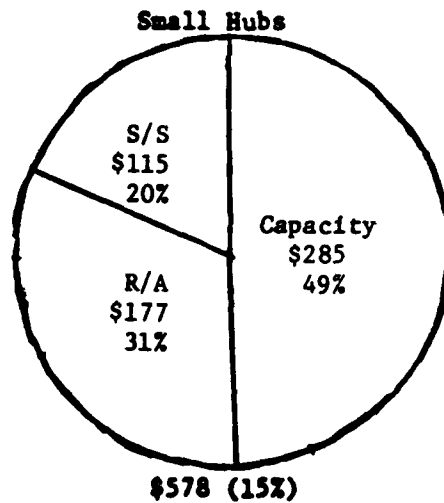
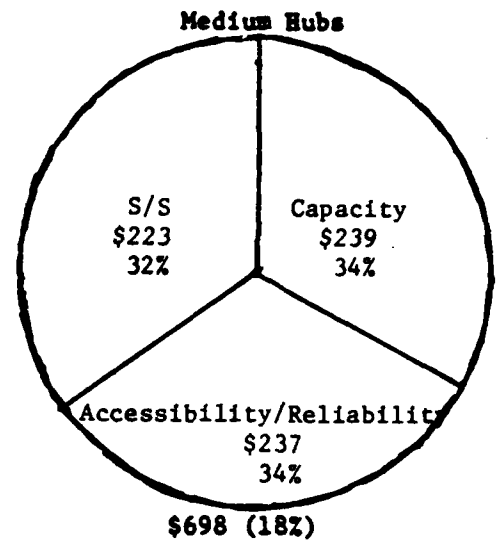
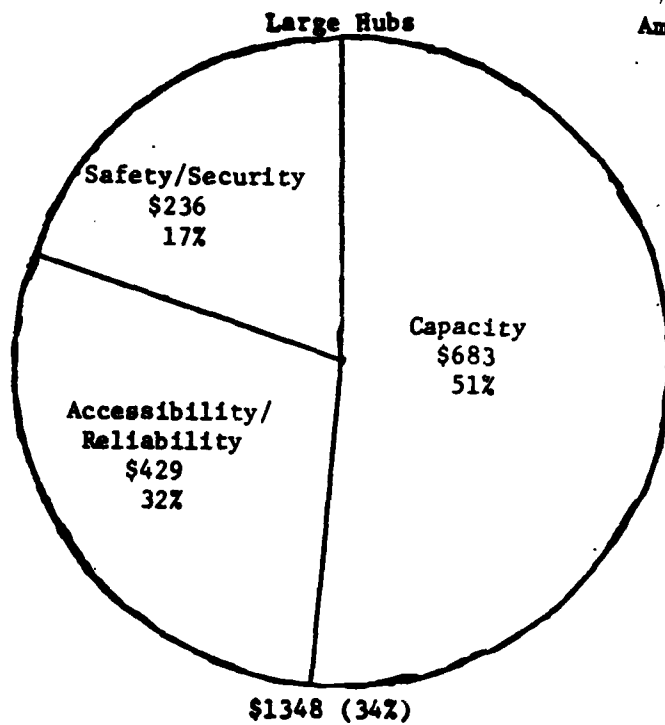
Figure 2.3

Distribution of ADAP Expenditures  
Among Airport Types, FY 1971-1978  
(Federal plus local funds, \$ millions)



Total = \$3917

Figure 2.4  
Distribution of ADAP Expenditures  
Among Airport Types and FAA Objectives  
(\$ millions)



### Selected Item Expenditures

Federal ADAP funds have been used to defray the cost of obtaining many specific items and pieces of equipment at NASP airports. In addition to the allocation of expenditures by objectives, the ADAP project files were used to identify expenditures on specific items of particular interest. These specific items were runway grooving; terminal buildings; approach light systems; visual approach slope indicators (VASI) and/or runway end identifier lights (REIL); instrument landing systems (ILS), nondirectional beacons (NDB), and/or terminal very-high-frequency omnidirectional ranges (TVOR); snow removal equipment; and crash/fire/rescue (CFR) equipment.

The sampled expenditures for these selected items were used to estimate the total expenditures for such items for all ADAP projects initiated prior to July 1978. These estimates are shown in Tables 2.8 and 2.9. Estimates of various categories of ADAP funding, such as these selected items, become increasingly less reliable the greater the disaggregation of the sampled ADAP expenditures. This is because greater disaggregation results in a smaller sample of each component of expenditure and, hence, a less reliable estimate of that component in the universe. Thus, the estimates in Tables 2.8 and 2.9 should not be considered as reliable as those in Tables 2.6 and 2.7.

TABLE 2.8  
ESTIMATED DISTRIBUTION  
FEDERAL SELECTED ITEM FUNDING (THOUSANDS OF DOLLARS)

	RUNWAY GROOVING	TERMINAL BLOC	ALS LANDING	VASI PEIL	ILS MDS TVOR	SNOW REMOVAL	C/F/R EQUIP/BLOC
A/C LRG MDS	15255	31496	2042	375	1170	0	17361
A/C MED MDS	4721	11536	261	1510	3690	0	14634
A/C SHL MDS	1253	0	525	1545	1452	1414	26265
A/C NON MDS	15441	0	3065	4179	4479	2000	52076
AP GRP SUM	36674	43032	5093	7609	10799	4302	111136
%	1.04	1.02	0.26	0.34	0.48	0.19	4.00
COMPUTER-BU	0	0	0	220	0	0	0
COMPUTER-BT	0	0	244	321	366	0	3292
COMPUTER-CU	42	0	106	220	566	0	156
COMPUTER-GT	469	0	44	270	27	690	657
AP GRP SUM	511	0	394	1047	959	690	4105
%	0.03	0	0.72	1.00	1.74	1.25	7.40
RELIEVER-BU	0	0	0	135	0	0	0
RELIEVER-BT	0	0	0	1265	0	0	0
RELIEVER-CU	16	0	59	256	429	0	100
RELIEVER-GT	0	0	0	275	0	0	609
AP GRP SUM	16	0	59	1931	429	0	797
%	0.01	0	0.05	1.77	0.39	0	0.73
GEN AVIA-BU	0	0	0	1273	0	395	0
GEN AVIA-BT	0	0	210	1000	602	0	0
GEN AVIA-CU	504	0	171	1505	2024	0	520
GEN AVIA-GT	0	0	169	117	617	0	0
AP GRP SUM	504	0	550	4063	3323	395	520
%	0.10	0	0.20	1.74	1.19	0.14	0.19
ITEM TOTALS	37705	43032	6096	15450	15510	5307	110566
%	1.41	1.00	0.26	0.58	0.50	0.20	4.34

TABLE 2.9  
ESTIMATED DISTRIBUTION  
FEDERAL + LOCAL SELECTED ITEM FUNDING (THOUSANDS OF DOLLARS)

	RUNWAY GROOVING	TERMINAL BLOC	ALS LANDING	VASI REIL	ILS MDS TYOR	SHOW REMOVAL	C/F/R EQUIP/BLOC
A/C LNS MUB	26551	55794	3189	559	1996	0	32556
A/C MEB MUB	7343	21826	379	2232	4971	0	19764
A/C SML MUB	1758	0	693	1886	1882	1512	29887
A/C NON MUB	15989	0	4862	4927	6116	2769	59867
AP GRP SUM	51641	76828	8243	9684	14885	4281	141194
%	1.86	2.30	0.26	0.29	0.46	0.13	4.23
COMPUTER-BU	0	0	0	286	0	0	0
COMPUTER-BT	0	0	278	353	349	0	4898
COMPUTER-CU	34	0	188	228	621	0	142
COMPUTER-GT	486	0	66	271	39	581	664
AP GRP SUM	528	0	452	1138	1089	581	4896
%	0.85	0	0.74	1.84	1.84	0.96	7.97
RELIEVER-BU	0	0	0	166	0	0	0
RELIEVER-BT	0	0	0	1523	0	0	0
RELIEVER-CU	38	0	68	338	515	0	126
RELIEVER-GT	0	0	0	322	0	0	762
AP GRP SUM	38	0	68	2349	515	0	888
%	0.02	0	0.06	1.88	0.36	0	0.80
GEN AVIA-BU	0	0	0	1748	0	418	0
GEN AVIA-BT	0	0	356	2421	888	0	0
GEN AVIA-CU	554	0	277	1912	2533	0	1378
GEN AVIA-GT	0	0	254	173	916	0	0
AP GRP SUM	554	0	887	6246	4337	418	1378
%	0.16	0	0.24	1.70	1.16	0.11	0.37
ITEM TOTALS	92745	76828	9458	19329	28746	5272	148356
%	1.35	1.98	0.26	0.48	0.53	0.13	3.78

### ADAP Environmental Projects

The ADAP expenditures for environmental projects, which are presented in Tables 2.6 and 2.7 are estimated to be about \$4 million in Federal funds and \$7 million in Federal plus local funds. Environmental projects became eligible for ADAP funds through the 1976 Amendments to the Act and subsequently only a relatively small number of projects have received grants.

Because the number of projects is small, the total expenditure on environmental projects could not be estimated from the sample with any confidence. Therefore, the environmental projects were investigated directly.

This investigation showed that through July 1978, there was one project which involved the enhancement of environmental quality (Objective No. 12) and 14 projects directed toward reducing the adverse impacts of noise (Objective No. 13). Table 2.10 contains a list of ADAP environmental projects and associated expenditures for the various types of airports.

Noise reduction is divided into three categories: land purchases; relocation assistance; and landscaping, demolition, etc. Each project may involve one or more of these activities. From Table 2.10, it is seen that the majority of projects involved the purchase of land, with over \$22 million (or 86%) of the total expenditures allocated toward environmental projects spent on this activity; another \$3 million was spent for relocation assistance related to these land purchases, making a total of over \$25 million, or 97 percent of total environmental expenditures. Most of the funding for projects that could be identified as purely environmental in purpose was at large air carrier hubs. These airports accounted for seven of the 14 projects and 73 percent of the total expenditures allocated toward environmental projects.

### Alaska

Due to its size, population distribution, topography, and climate, Alaska is unique with respect to its air transportation and airport system. The ADAP apportionment mechanism takes into account the state's unique reliance on air transportation. Because it is so different from the rest of the Nation, the ADAP in Alaska was studied in more detail; the results of this analysis are reported in Appendix A.



TABLE 2.10 ADAP ENVIRONMENT PROJECTS THROUGH JULY 1978\*

	Objective No. 12-Enhance Environmental Quality		Objective No. 13 Reduced Adverse Impact of Noise						Total Environmental Projects		
	No. Projects	\$ (000)	Purchase Land	Relocation Assistance		Demolition, Landscape and Noise Barriers					
				No. Projects	\$ (000)	No. Projects	\$ (000)	No. Projects	\$ (000)	No. Projects	\$ (000)
A/C - Large Hub	1	204	7	15007	5	2830	3	333	7	19274	73.1
A/C - Medium Hub	0	0	2	4851	0	0	0	0	2	4851	18.4
A/C - Small Hub	0	0	1**	1292	0	0	1	175	2	1467	5.6
A/C - Non Hub	0	0	1	390	1	19	1	67	2	476	1.8
Reliever	0	0	1	252	1	53	0	0	1	305	1.2
Total ***	1	204	12	22092	7	2902	5	575	14	26373	100.0
Percent		0.8		88.0		11.0		2.2		100.0	

\*Federal + Local Funds (Average Federal Share = 77 percent).

\*\*A multi-year grant actually involving three ADAP projects.

\*\*\*Numbers of projects are not additive horizontally because most projects are separated, or applied, among more than one objective.

## CHAPTER III

### IMPACT ON THE NATIONAL AVIATION SYSTEM

The performance of the national aviation system is dependent upon a large number of factors. Improvements to the system come from a variety of sources: Federal assistance programs, State aid, and expenditures by local sponsors and airlines. For example, congestion and delays at airports are clearly affected by technology advances in air traffic control and the size of aircraft operated by the airlines, as well as airport improvements such as parallel and crosswind runways and terminal facilities. Thus, it is very difficult to relate ADAP costs, allocated to objectives, to benefits, or to achievement of objectives. Though no precise causal relationships can be established, it seems apparent that the ADAP has contributed toward the attainment of the FAA's objectives.

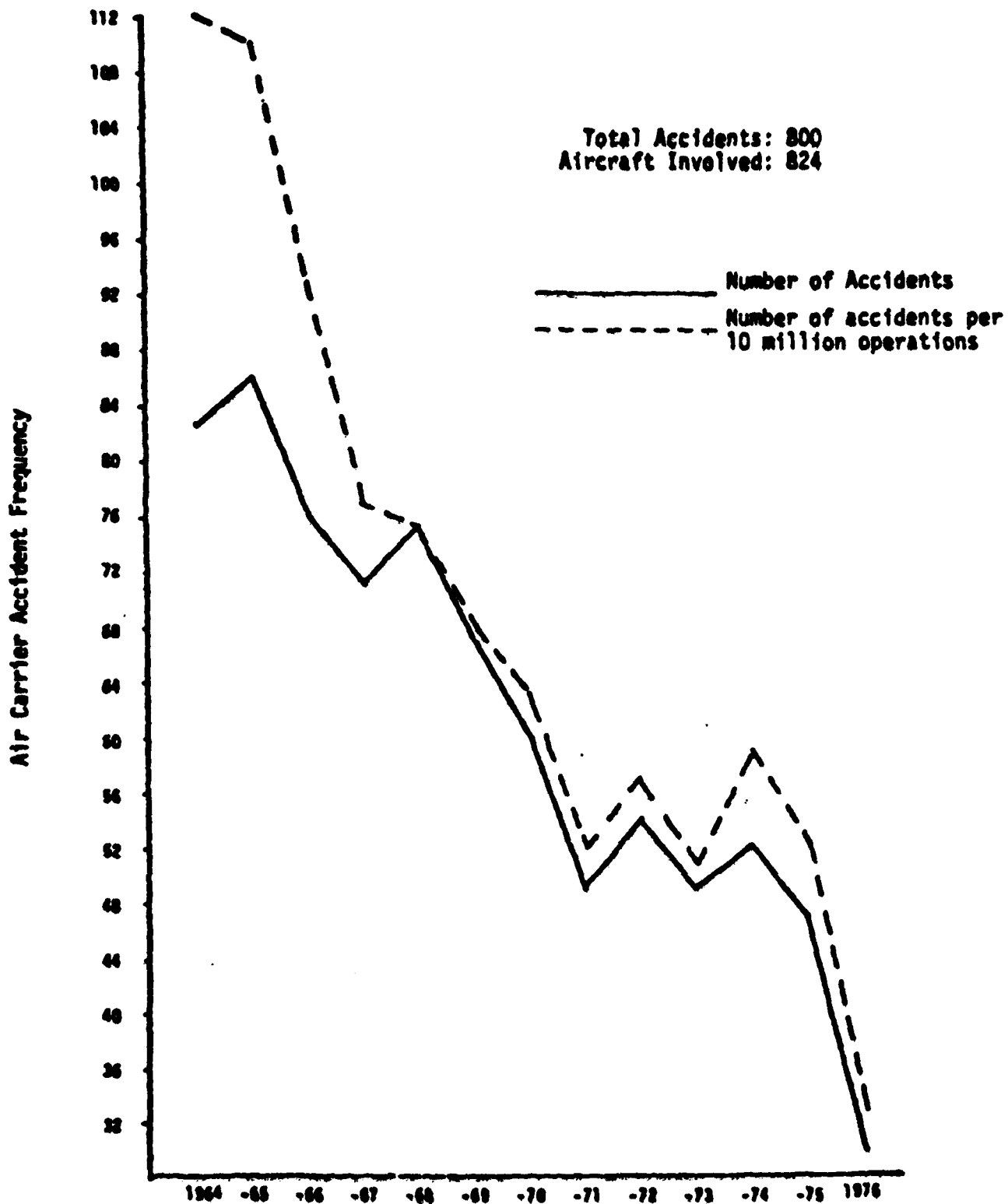
#### Safety

Provision of a safe and secure air transportation system is the FAA's primary objective. Within the scope of ADAP objectives, the FAA provides standards for adequate safety margins to insure that no aircraft accidents are caused by airport design deficiencies, and encourages the development and implementation of new equipment to increase safety margins. Furthermore, the FAA requires that adequate emergency equipment be available at air carrier airports, should the need arise.

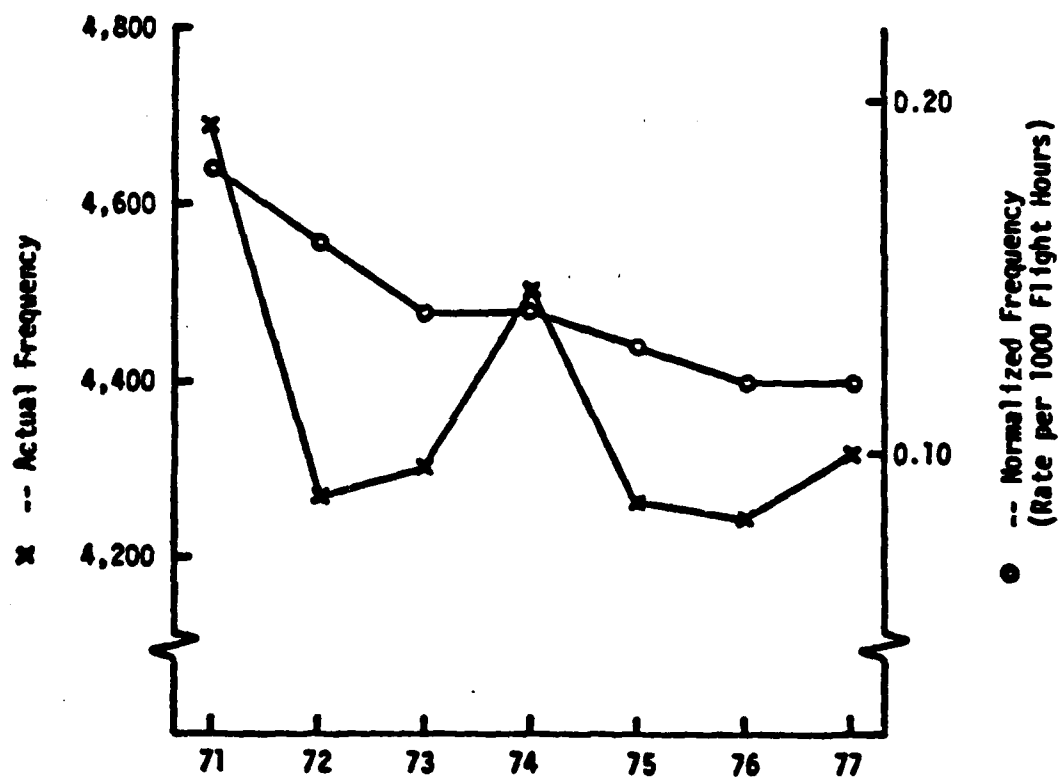
Over the 1964 through 1976 time period, there were 800 air carrier accidents involving 824 aircraft. The frequency distribution of these accidents for this 13 year period is shown in Figure 3.1. It is seen from this figure that the number of accidents per year declined significantly between 1964 and 1971, remained fairly constant through 1974, and again declined in 1975 and 1976. The highest number of accidents (86) occurred in 1965 and the lowest number of accidents (30) occurred in 1976. Adjusting these absolute annual frequencies to an annual rate, expressed in terms of the number of accidents per ten million operations, shows a more precipitous decline in the mid-1960's; but no significant deviation from the corresponding absolute frequencies thereafter. In these terms, it is seen from Figure 3.1 that accidents per ten million operations was at its highest (112) in 1964, and at its lowest (33) in 1976.

Less than 4% of the causes/factors cited for these accidents by the National Transportation Safety Board were related to airport facilities (such as approach lighting) or airport conditions (such as wet runways, snow, or soft shoulders). Furthermore, the weights assigned (costs allocated) to these airport related causes/factors have averaged less than 1%. Both of these rates, the proportion of airport related accident causes/factors and the weighted contribution of the causes/factors to accidents, have consistently been low.

Figure 3.2 shows the trend of general aviation accidents between 1971 and 1977. The number of accidents, normalized by flight hours, has declined steadily over this period. Only about 5 1/2% of the causes/factors cited for these accidents were related to airport facilities or conditions.



**FIGURE 3.1 AIR CARRIER ACCIDENT HISTORY**  
**(January, 1964 through December, 1976)**



**FIGURE 3.2** Seven Year General Aviation Accident History with Actual and Normalized Frequencies of Occurrences (1971-1977)

## Capacity

Another important objective of the FAA is minimizing aircraft congestion and delays at airports. Reduced congestion and delays result in increased levels of safety and energy savings, as well as time savings for passengers. In order to meet these objectives, the FAA encourages the construction and improvement of those airport components which are required to provide adequate airside and landside capacity.

Congestion and delays at airports are clearly affected by such factors as technology advances in air traffic control and the fleet mix of aircraft operated by the airlines, as well as airport improvements such as parallel and crosswind runways and terminal facilities. While precise causal relationships between such airport development projects and reduced delays are therefore difficult to establish, some types of projects lend themselves to direct measures of delay reduction. Such measurements have been made and evaluated for parallel runway projects at major airports using the FAA's Airport Performance Model (APM).

The APM is a computer simulation of airport delay and congestion prepared to help evaluate the benefits of capacity-related investments in the Nation's airports. The model estimates delay reduction in landing, takeoff, and gate docking, reduction in fuel consumed and pollutants emitted, and dollar benefits to passengers and aircraft operators resulting from such investments. It does not include safety or noise reduction benefits, nor increases in community values. Delay estimates from the model showed reasonably good agreement with validation data taken at Kennedy, La Guardia, and Newark.

The model has a data base comprising thirty-one high density airports, including seven of the twelve air carrier airports which have had new parallel runways constructed with ADAP assistance. The investment in these seven parallel runways was evaluated with the APM. Inputs to the model are the cost of the investment, annual maintenance costs incurred by the investment, and aircraft processing rates (operations per hour) before and after the investment.

The total cost of each parallel runway, including parallel and connecting taxiways and associated landing aids, were obtained from the ADAP project files. Annual maintenance costs were estimated at 9¢ per square yard of runway and taxiway surface. The processing rates were derived from Techniques for Determining Airport and Airside Capacity and Delay, FAA-RD-74-124, June 1976.

The benefit-cost ratios of these seven investments in parallel runways over the ten-year period from 1979 to 1989 range from 1.1 to 18.9 and average 6.6. The benefits are based upon the expected reduction in delays resulting from the parallel runway, the difference between projected delays over the ten-year period with and without the parallel runway.

Thus, it appears that the benefits derived from ADAP investments in new parallel runways at busy airports average something on the order of six times the cost of such investments.

## CHAPTER IV

### PAST SPENDING PATTERNS AND FUTURE NASP DEVELOPMENT REQUIREMENTS

#### NASP Objectives

The most recent National Airport System Plan (NASP) publication, in January of 1978, categorized airport development costs under four headings: land, paving and lighting, approach aids, and other development. The NASP data base, which is stored and updated on a computerized data retrieval system, has since been modified to provide an additional breakdown of costs into three broad airport system objectives, which are broken down further into six categories of development. These NASP objectives and development categories are:

#### A. Maintain Airport System Condition

##### 1. Special Programs:

- a. C/F/R vehicles, equipment, and buildings
- b. Snow removal equipment
- c. Security equipment
- d. Approach and navigation aids
- e. Lighting
- f. Removal of hazards and obstructions
- g. Runway grooving and friction courses
- i. Runway safety areas

Note: Items e-i are categorized under special programs only when they are not part of a runway construction project.

2. Reconstruction of aging or deteriorated facilities which otherwise would require extraordinary amounts of maintenance.

#### B. Bring Airports up to Design Standards

3. Development to bring existing airport facilities up to current FAA design standards.

#### C. Expand the Airport System

4. Upgrade airport to accommodate larger or more demanding aircraft.
5. Capacity development to reduce delays and congestion.
6. New airports to provide communities with air transportation and to supplement congested airports in metropolitan areas.

Only a few adjustments are necessary to align the ADAP Study List of Objectives with the NASP categories. These adjustments are shown in Table 4.1.

TABLE 4.1

<u>NASP Categories</u>	<u>ADAP Objectives*</u>
1. Special Programs	4. C/F/R Facilities 5. Security X. Runway Grooving
2. Reconstruction	9. Preserve or Improve
3. Design standards	2. Design Standards 3. Safety Margins (less runway grooving) 10. Increase Usability
4. Upgrade	8. Upgrade
5. Capacity	6. Airside Capacity 7. Landside Capacity
6. New Airports	11. Provide or Improve Access

\*See Table 2.1 for definition of objectives.

The estimated distribution of ADAP expenditures shown in Table 2.6 and 2.7 were realigned according to these NASP development categories. The resulting estimated distribution is shown in Tables 4.2 and 4.3 and graphically depicted in Figures 4.1, 4.2, and 4.3.

TABLE 4.2

Estimated Distribution (\$ Millions)  
Federal ADAP Expenditures

Airport Type	Special Programs	Reconstruct	Standards	Up-grade	Capacity	New Airports	Total
AC Large Hub	54	111	109	58	338	104	774
Medium Hub	26	131	162	34	112	-	465
Small Hub	38	114	79	97	114	-	442
Non Hub	80	130	122	130	85	12	559
Total	197	486	472	319	649	116	2239
CS BU	-	3	1	-	-	-	4
BT	4	5	5	3	4	-	22
GU	1	3	5	2	2	-	13
GT	1	5	6	2	3	-	17
Total	6	16	17	7	9	-	55
RL BU	-	-	-	-	4	3	7
BT	2	4	26	10	15	9	65
GU	-	2	3	2	5	4	18
GT	1	8	5	-	5	-	19
Total	3	14	34	12	29	16	109
GA BU	1	9	30	4	9	33	87
BT	1	21	35	7	11	9	85
GU	3	13	33	33	15	3	101
GT	-	3	1	2	-	-	7
Total	4	47	100	46	36	45	279
Total	212	562	625	384	723	177	2683



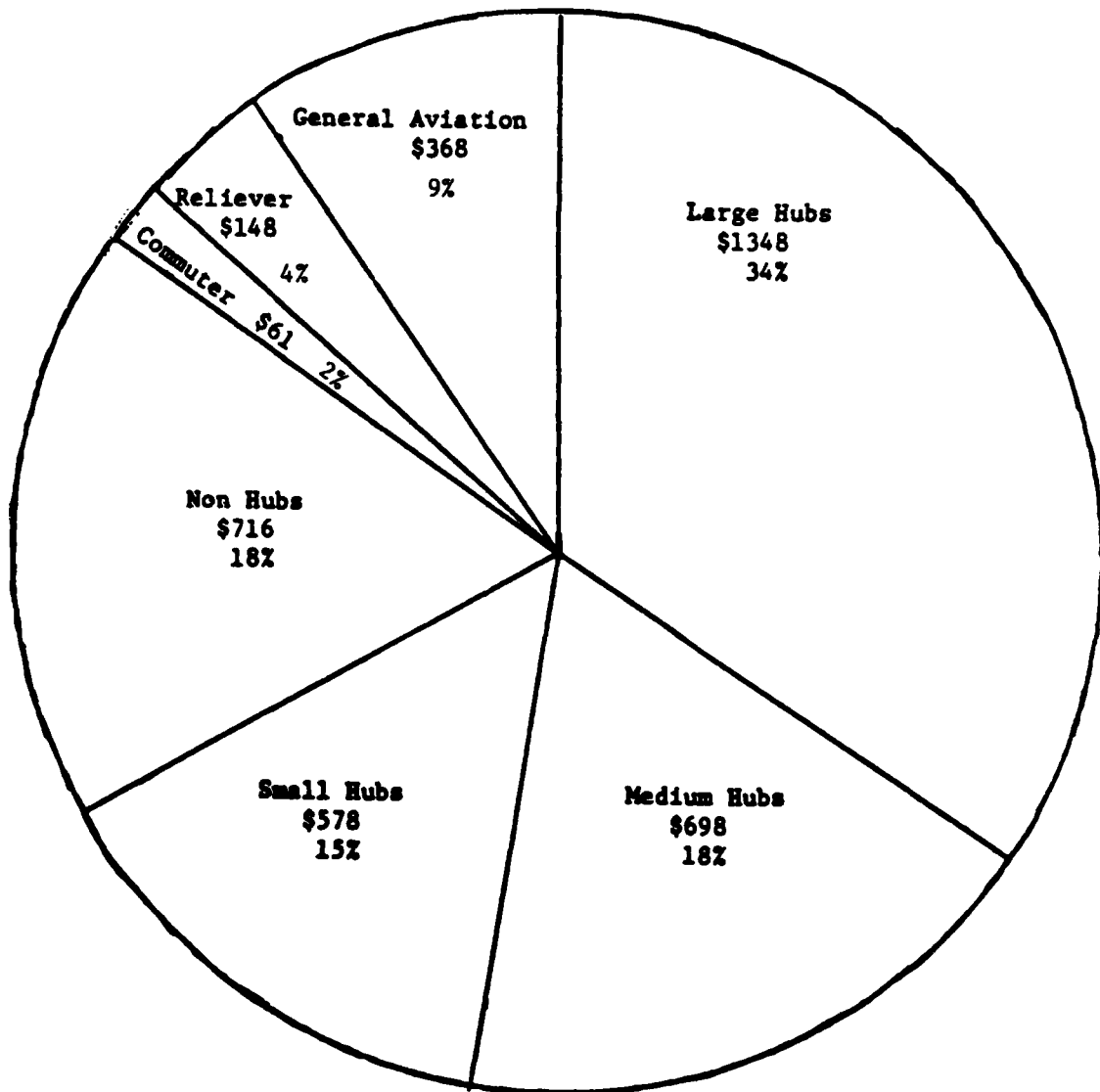
TABLE 4.3

Estimated Distribution (\$ Millions)  
Federal plus Local ADAP Expenditures

Airport Type	Special Programs	Reconstruct	Standards	Up-grade	Capacity	New Airports	Total
AC Large Hub	97	193	200	92	591	174	1348
Medium Hub	36	189	234	53	186	-	698
Small Hub	43	148	100	134	152	1	578
Non Hub	89	168	172	166	108	12	716
Total	265	700	707	444	1037	186	3340
CS BU	-	3	1	-	-	-	4
BT	5	6	6	3	4	-	24
GU	1	3	6	2	2	-	15
GT	1	5	7	2	3	-	19
Total	7	17	20	8	9	-	61
RL BU	-	-	-	-	5	3	9
BT	3	7	35	11	17	16	89
GU	1	2	5	3	8	6	24
GT	2	10	7	-	7	-	25
Total	6	19	48	14	37	25	148
GA BU	1	11	39	5	13	45	115
BT	1	25	50	11	15	13	116
GU	4	17	42	41	18	5	127
GT	-	5	3	3	-	-	10
Total	6	59	134	60	45	63	368
Total	283	795	910	526	1128	275	3917

Figure 4.1

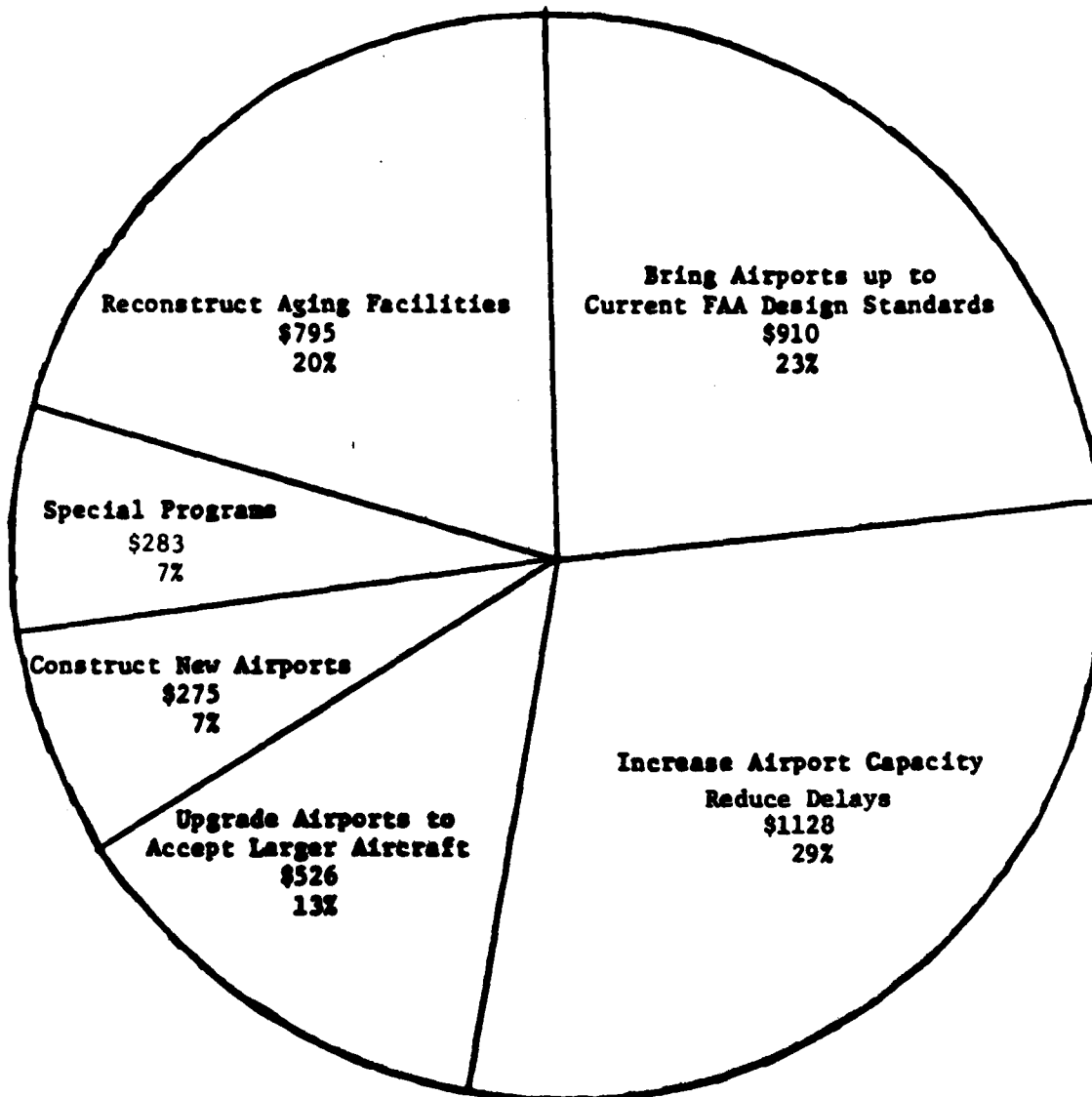
Distribution of ADAP Expenditures  
Among Airport Types, FY 1971-1978  
(Federal plus local funds, \$ millions)



Total = \$3917

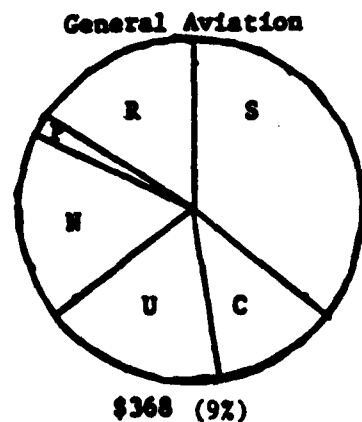
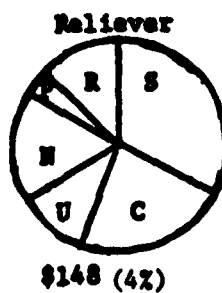
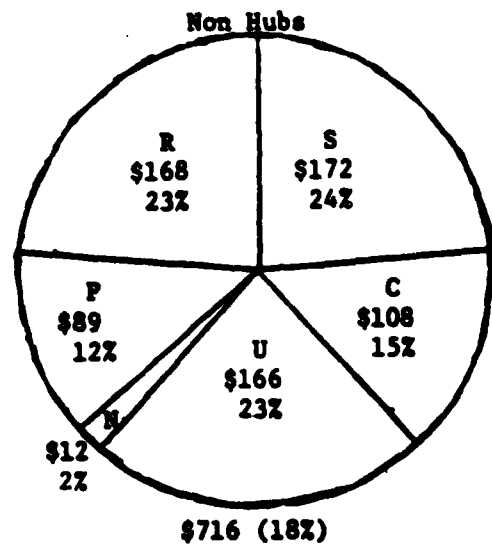
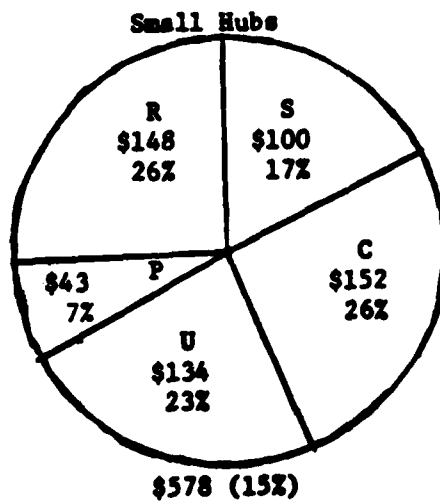
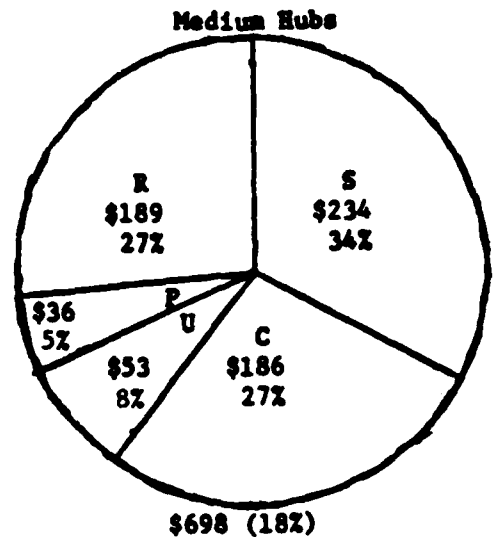
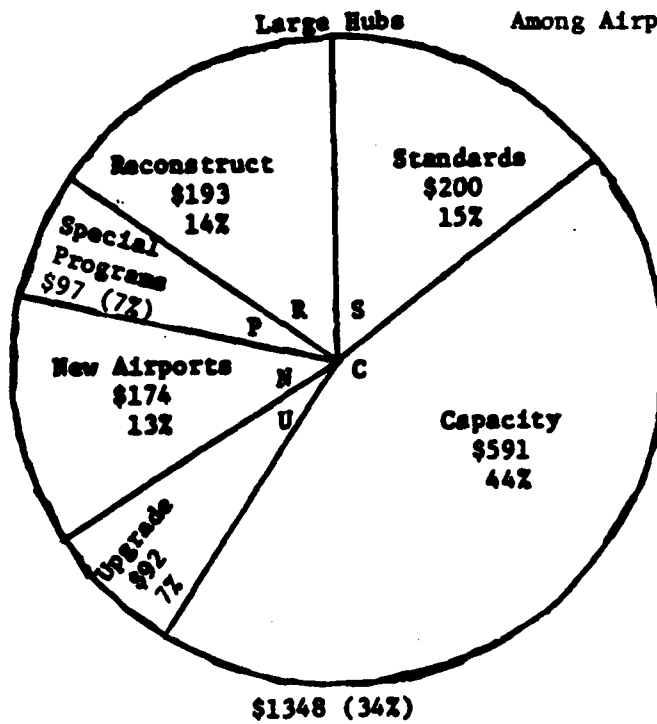
**Figure 4.2**

**Distribution of ADAP Expenditures  
Among NASP Development Categories, FY71-78  
(Federal plus local funds, \$ millions)**



**Total = \$3917**

Figure 4.3  
Distribution of ADAP Expenditures  
Among Airport Types and NASP Development Categories  
(\$ millions)



### Future Demand for Federal Aid

The adequacy of a continued program of Federal aid to meet future airport requirements can be assessed to some extent by comparing past expenditures to anticipated airport development needs. The needs in this case are those shown in the most recent National Airport System Plan (NASP) publication, restated by objectives (Figures 4.4 and 4.5), so that they can be compared directly to the actual ADAP expenditures shown in Figures 4.2 and 4.3.

A comparison of Figure 4.2 (expenditures) to Figure 4.4 (needs) shows a need for some increase in overall program funding levels to keep pace with future development needs. Second, it suggests that there probably will be a lessening program emphasis in the future on reconstruction of aging facilities. This is likely with increased funding levels because, in the past, projects to expand system capacity were sometimes deferred to permit available funds to be directed to more urgent, safety related projects, such as the rehabilitation of deteriorating runways, instead of toward system expansion.

Further insights can be gained by comparing Figures 4.3 and 4.5. This comparison reveals significant differences between the past distribution of expenditures and anticipated future needs by type of airport. Air carrier airports have received a relatively large share of ADAP funds (85 percent of total expenditures) but currently have only 61 percent of estimated future needs. On the other hand, general aviation airports, which have received only nine percent of past expenditures, are now estimated to have approximately 27 percent of future needs. Commuter and reliever airports are also estimated to have future needs substantially greater than their past share of actual ADAP expenditures.

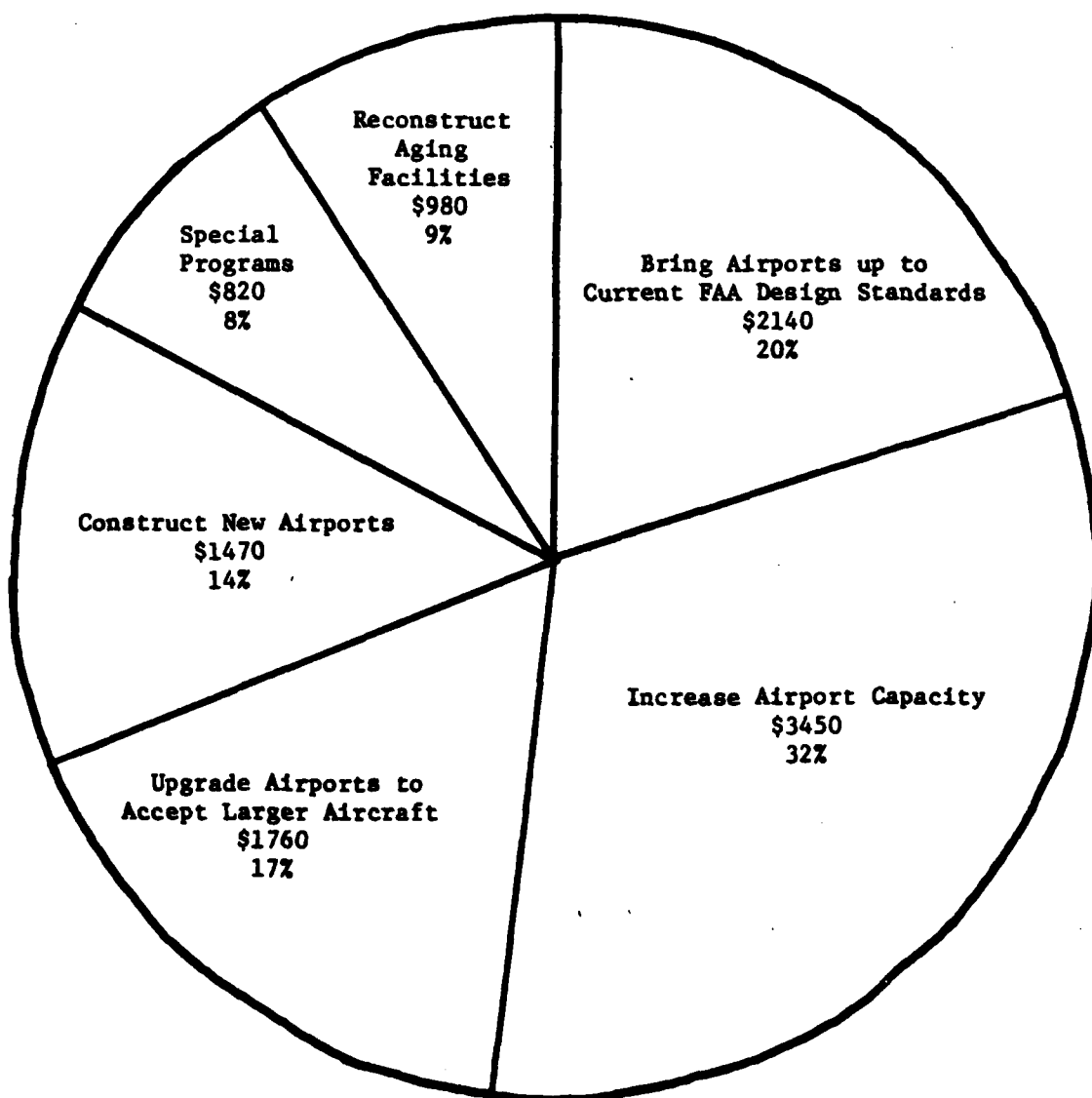
These differences are largely due to the apportionment formulas under the current Act, which determine how ADAP funds are distributed. To some degree, air carrier airports could be expected to receive a larger share of Federal aid anyway, since they provide the public with the facilities and services necessary to accommodate scheduled air passenger service, are responsible (through the 8% passenger ticket tax) for the bulk of the contributions to the Trust Fund, and are more likely to have active local sponsors who are willing and able to undertake needed development. General aviation airports do not always enjoy such active support.

There is evidence that reliever airports, at least, have probably been underfunded in the past, thereby curtailing efforts by local sponsors to increase the capacity of the reliever system. As an indicator of the potential need for greater reliever airport development, at the end of fiscal year 1978, the FAA had on hand requests-for-aid from reliever airports that amounted to more ADAP funds than had been granted to such airports over the preceding eight years.

In view of these comparisons between past expenditures and estimated future needs, it would appear that any proposal for continued Federal aid to airports should provide for some increase in overall funding, with special emphasis on significantly increased funding for reliever airports.

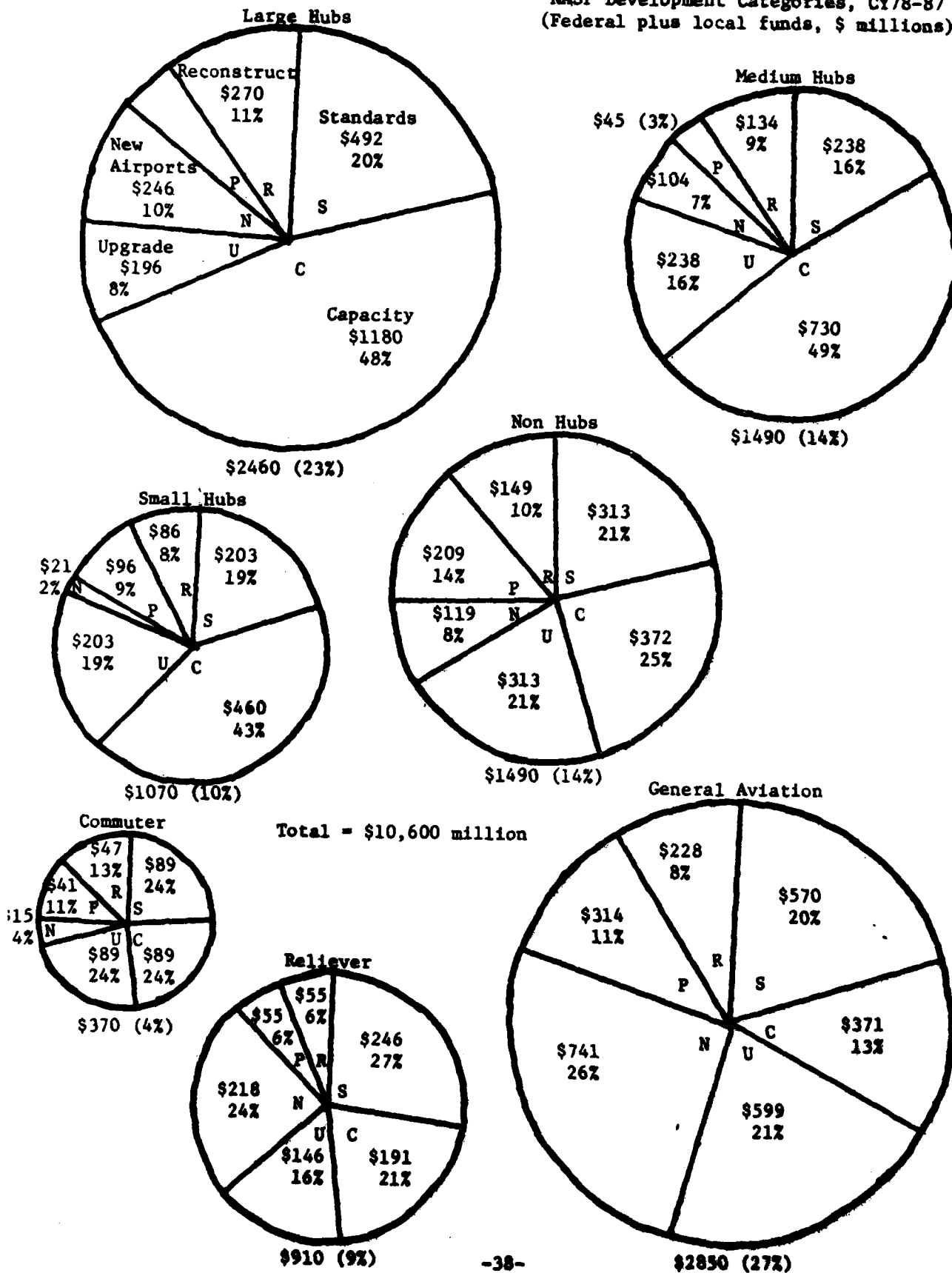
Figure 4.4

Distribution of NASP Needs  
Among NASP Development Categories, CY 1978-1987  
(Federal plus local funds, \$ millions)



Total = \$10,600 million

Figure 4.5  
Distribution of NASP Needs  
Among Airport Types and  
NASP Development Categories, CY78-87  
(Federal plus local funds, \$ millions)



## APPENDIX A

### ALASKA

Due to its size, population distribution, topography, and climate, Alaska is unique with respect to its air transportation and airport system. Its small population is unevenly distributed over a vast area. Almost half of the population is concentrated in the four cities of Anchorage, Fairbanks, Juneau, and Ketchikan. The remainder of the population is scattered among about 300 towns and native villages throughout the state. Only 25 towns in the state exceed a population of 750 and only about 160 exceed a population of 100.

During the 1920s and 30s nearly all of the large and small communities in the state converted directly from animal powered transportation into the air age and the pattern of some sort of air service to the smallest locations was firmly established. The high cost of highway and railroad construction in Alaska's harsh climate and unstable soil conditions, and the unusually long distances involved, contributed significantly to the state's reliance on air, rather than highway or rail, transportation.

Of the Nation's 620 air carrier airports, 200, or 32%, are located in Alaska. The ADAP apportionment mechanism takes into account the state's reliance on air transportation by: (1) the general aviation state apportionment formula being based upon area as well as population, and (2) providing minimum apportionments of \$50,000 to 125 air carrier airports and \$150,000 to 48 air carrier airports, regardless of the number of passenger enplanements at these airports. Table A.1 shows the FY-79 apportionments to Alaska's air carrier airports.

The apportionments to Alaska's air carrier airports amount to over 5% of the apportionments to all of the Nation's air carrier airports, though these 200 airports enplane less than 1% of the Nation's air carrier passengers. The State owns the majority of the NASP general aviation airports and all of the air carrier airports, except for Juneau, Kodiak, and two small airports owned by tribal agencies. Thus, the state is the single sponsor for virtually all ADAP projects in the state.

Though the apportionments to Alaska's air carrier airports are based on enplanements at 180 or more airports, subject to the \$50K and \$150K minimum noted above, over half of the Federal ADAP funds have been spent on projects at the ten largest airports and the remainder on projects at only 45 other airports. In other words, current legislation provides funds for improvements to the many small Alaskan airports but the sponsor (State of Alaska) has actually concentrated ADAP expenditures at relatively few of the state's airports. The distribution of apportionments and actual ADAP expenditures is shown in Table A.2.



TABLE A.1

ADAP Apportionments to Alaska's Air Carrier Airports, FY-79\*

	<u>\$1000s</u>	<u>%</u>
Anchorage	1616	8.8
Fairbanks	827	4.5
Juneau	591	3.2
Ketchikan	391	2.1
Deadhorse	348	1.9
Matlakatla	317	1.7
Kodiak	262	1.4
Sitka	242	1.3
Bethel	193	1.0
Nome	<u>163</u>	<u>0.9</u>
Subtotal, ten largest	4950	26.9
125 airports, \$50K each	6250	34.0
48 airports, \$150K each	7200	39.1
TOTAL	18400	100

\*Full formula apportionments; actual apportionments reduced by about 1.4% to a total of \$18,138 thousand.

**TABLE A.2**  
**Distribution of Apportionments and ADAP Expenditures in Alaska**

<u>Airport</u>	<u>% of FY 79 Apportionment</u>	<u>% of Federal ADAP Expenditures FY 71-78</u>
Anchorage	8.8	19.9
Fairbanks	4.5	9.0
Juneau	3.2	4.9
Ketchikan	<u>2.1</u>	<u>4.6</u>
 Total, four largest	18.7	38.4
Next six largest <sup>1</sup>	8.2	12.6
125 "\$50K" Airport	34.0	
		49.0 <sup>2</sup>
48 "\$150K" Airports	39.1	

<sup>1</sup> Deadhorse, Metlakatla, Kodiak, Sitka, Bethel, and Nome

<sup>2</sup> Funds were used at only 45 of these 173 airports. 3.3% of this 49% was at Anchorage area airports (Lake Hood/Spenard and Merrill), making a total of over 23% on the Anchorage peninsula.

The distribution of ADAP expenditures among objectives has been somewhat different in Alaska than in the rest of the United States. Considerably less has been devoted to safety oriented projects and a good deal more toward providing reliable and accessible air transportation, especially to remote communities and under varying weather conditions. In the capacity area, Alaska has spent more on airside capacity and much less on landside capacity, as might be expected. This pattern of ADAP expenditures is illustrated in Table A.3.

Table A.3  
Distribution of Federal ADAP Funds Among Objectives, FY 71-78

	U.S. (Less Alaska)		Alaska	
	<u>\$1000s</u>	<u>%</u>	<u>\$1000s</u>	<u>%</u>
Safety	639,235	25.2	15,508	10.3
Design Standards	394,136	15.2	6,173	4.1
Safety Margins	93,832	3.7	452	0.3
C/F/R Facilities	111,555	4.4	7,076	4.7
Security	49,712	2.0	1,807	1.2
Capacity	1,046,785	41.3	59,621	39.6
Airside	508,996	20.1	39,597	26.3
Landside	173,296	6.8	903	0.6
Upgrade	364,493	14.4	19,121	12.7
Reliability/Accessibility	842,077	33.3	75,429	50.1
Reconstruction	530,963	21.0	31,467	20.9
Increase Usability				
(Weather)	159,826	6.3	17,916	11.9
Improve Access	151,288	6.0	26,046	17.3
Total	2,532,352*	100.0	150,558	100.0

\* Includes \$4,255 for environmental projects.